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September 13, 1999

Mr. James Pedri
Assistant Executive Officer
California Regional Water Quality Control Board
Central Valley Region
415 Knollcrest Drive, Suite 100
Redding, CA 96002

SUBJECT: RESPONSE TO NOTICE OF VIOLATION
VIOLATION OF WDR ORDER NO. 88-037
AND GENERAL ORDER NO. 93-200
ALTURAS CLASS III LANDFILL

Dear Mr. Pedri:

SHN Consulting Engineers and Modoc County staff have reviewed your letter dated June 16, 1999, and our responses follow.

ISSUE 1: *The inspection and review of the files indicated that monitoring is not occurring as required in your WDRs.*

The County is under contract, and has contracted for the last three years, with Lawrence and Associates to sample the onsite monitoring wells in accordance with WDR Order No. 88-037 and General Order No. 93-200. The next monitoring report should be submitted to the RWQCB within the next quarter.

ISSUE 2: *In addition to the failure to submit the monitoring data specified in the WDRs, review of existing data indicates that a release of waste to groundwater has occurred. Previous monitoring reports show indicator parameters including electrical conductivity, chloride, sulfate, and total dissolved solids were significantly higher in downgradient wells.*

Five groundwater monitoring wells (OB-1 through OB-5) were installed at the site in 1987. Historically, the electrical conductivity, chloride and total dissolved solid (TDS) concentrations in Monitoring Well OB-2 have been consistently higher than concentrations in the other four wells, specifically Monitoring Well OB-5 which is located topographically

upgradient from Monitoring Well OB-2. Without evaluating additional information, the elevated levels could lead to the conclusion that a release from the nearby landfill has occurred. The following hydrogeologic conditions at the site do not support this conclusion:

- Although the concentrations in Monitoring Well OB-2 are elevated over the levels in Monitoring Well OB-5, the levels have been elevated consistently since the well was installed in 1987. Based on this information, if a release has occurred, the full impact of the release reached Monitoring Well OB-2 prior to when the well was installed.

- The nearest landfill cell is located approximately 1,500 feet upgradient from Monitoring Well OB-2, and was operated between the late 1970's until the late 1980's. Based on local hydrogeologic conditions, it would take more than 10 years for the full impact of a release to be observed in the vicinity of Monitoring Well OB-2.

- Although Monitoring Well OB-2 is located topographically down slope from a former landfill cell, it is located in a distinctly different geologic formation and hydrologic environment than the other wells.

TDS Levels: The TDS levels in Monitoring Wells OB-2 and OB-5 are shown on Figures 1 and 2. Although a parametric analysis of variance (ANOVA) test indicates that the mean TDS concentration in Monitoring Well OB-2 is higher than the mean concentration in Monitoring Well OB-5, an examination of the time series plot for Monitoring Well OB-2 indicates no increasing or decreasing trend between 1990 and 1998. The absence of a trend in Monitoring Well OB-2 would indicate either; (1) The full impact of a release was observed prior to the installation of Monitoring Well OB-2, or (2) The groundwater samples are not being collected from two distinct populations (ANOVA assumes that the population being sampled is the same). In contrast, Monitoring Well OB-5 shows an increasing trend at the 95 confidence level (i.e., there is a 5 percent probability that the level is not increasing). Monitoring Well OB-5 is located adjacent to the seepage pond.

Based on the following discussion, it is unlikely that a release would have migrated from the waste cell, vertically into the underlying groundwater, and laterally 1,500 feet prior to the installation of the Monitoring Well OB-2. A more likely cause for the elevated levels in OB-2 is that wells OB-2 and OB-5 are screened in two distinct geologic formations and, as a result, the samples are being collected from two separate populations.

Electrical conductivity and chloride levels were not addressed specifically in this response letter because the TDS levels reflect both these parameters. These parameters will be addressed specifically in the required annual monitoring report.

Groundwater Migration: Monitoring Well OB-2 is located in the lower portions of a canyon that was used for waste disposal primarily between the late 1970's and late 1980's. The distance between the fill area and Monitoring Well OB-2 is approximately 1,500 feet. The measured hydraulic gradient in this area was 0.0013 foot per foot in March 1998. Although the hydraulic conductivity of the screened interval in Monitoring Well OB-2 has not been determined, a conservative estimate based on the geology is 50 feet per day.

Assuming a hydraulic conductivity of 50 feet per day, hydraulic gradient of 0.0013 foot per foot, and an effective porosity of 0.2, the estimated groundwater velocity is 120 feet per year. Based on a groundwater velocity of 120 feet per year, it would take more than 12 years for a release to reach Monitoring Well OB-2. If a release occurred in 1978, assuming one-dimensional flow, the levels in Monitoring Well OB-2 would begin increasing sometime prior to 1990, be equal to ½ of the maximum concentration in 1990, and continue to increase beyond 1990. A trend analysis of TDS levels in Monitoring Well OB-2 was shown in Figure 1, and an increasing trend between 1990 and 1998 is not present.

Geology: As shown in Figure 3, geologic formations exposed in the vicinity of the landfill include alluvium, lake deposits, volcanic breccia and tuff. Information presented on the original well logs and summarized below support the conclusion that the wells are located in three distinct geologic formations.

- OB-1. Sandy clayey silt underlain by volcanic bedrock beginning at a depth of 10 feet. Drill cuttings consisted of black, sharp angular fragments and black cinders. The depth to water is approximately 10 feet (i.e., **water occurs in volcanic deposits**).

- **OB-2.** Clayey silt and silty clay to 15 feet in depth, underlain by sand and gravel to 31.5 feet in depth. The depth to water is approximately 10 feet (i.e., **water occurs in sand and gravel deposits**).

- OB-3. Silt to a depth of 34.5 feet in depth; sand, clay and silt between 42 and 50 feet in depth. The depth to water is approximately 30 feet (i.e., **water occurs in sand, clay and silt deposits**).

- OB-4. Silt and clay to 45 feet in depth, clayey sand between 45 and 55.5 feet in depth. The depth to water is approximately 30 feet (i.e., **water occurs in silt and clay deposits**).

- **OB-5.** Silt to 30 feet in depth underlain by volcanic breccia. The depth to water is approximately 20 feet (i.e., **water occurs in silt and volcanic deposits**).

Based on the geology mapped in the area and on the information presented on the original well logs, Monitoring Wells OB-1 and OB-5 are screened and draw water from volcanic deposits (Warms Spring Tuff). Monitoring Wells OB-3 and OB-4 are screened in silt and clay deposits (Alturas Formation), and Monitoring Well OB-2 is screened in sand and gravel deposits (Intermediate Alluvium). In other words, based on the local geology, it would be surprising if the mean TDS concentrations in Monitoring Wells OB-2 and OB-5 were statistically equal, and is anticipated that they would be very different.

Groundwater Recharge: Perched water was encountered at a depth of 3 feet when Monitoring Well OB-1 was installed, and at a depth of 9 feet when Monitoring Well OB-2 was installed. Perched water in the vicinity of these wells suggest that recharging water in the vicinity of these wells undergoes a slightly different chemical history than recharging water in the vicinity of Monitoring Wells OB-3, OB-4 and OB-5.

Summary: The elevated levels of electrical conductivity, TDS and chloride observed in Monitoring Well OB-2 do not support the conclusion that a release has occurred from the Alturas landfill. The consistently high levels reflect variations in the local hydrogeologic conditions. As required in Title 27, a more detailed analysis of the concentration levels in all of the wells will be submitted to the RWQCB as part of the required annual monitoring summary report. As presented above, a preliminary analysis indicates that the TDS levels in Monitoring Well OB-5, previously believed to represent background conditions, are increasing at the 95 percent confidence level. Monitoring Well OB-5 is located adjacent to the pond used for septage disposal. The total increase over the last 10 years has been less than 50 mg/l. This issue will be discussed further in the required annual report.

ISSUE 3: *Finally, in order to be in full compliance with the facility WDRs Order No. 88-037, General Order No. 93-200, Title 27, and the Standard Provisions and Reporting Requirements for Title 27, information including, but not limited to, developing financial assurances for cleanup of foreseeable releases, preparation of the Water Quality Protection Standard Report, Annual Monitoring Summary Report, and Constituents of Concern 5 Year Report must be submitted to this agency.*

Usable groundwater in the area occurs at a depth of approximately 100 to 125 feet below ground surface (BVA, 1996). Based on this information and on the general location of the Alturas landfill, the most probable response to the forseeable would involve capping and closing the landfill in accordance with current regulations. A financial assurance mechanism for closing the landfill is currently in place. As for preparing the Water Quality Protection Standard Report, Annual Monitoring Summary Report, and Constituents of Concern 5 Year Report, monies for these items are allocated on an annual basis because they involve relatively minor expenditures.

The County of Modoc continues to make every effort to comply with WDR Order 88-037 and General Order 93-200.

Please call me or Wendy Johnston at (530) 221-5425 if you have questions on the enclosed.

Sincerely,

John Andrews
Registered Geologist
RG:4269